



George Washington Carver and the Sweet Potato

Grade 1

Standards

GPS.SS1H.1; MCC1.NBT.2;
NGSS.1.LS1.A

Time

(6) 45 min periods over the year

Supplies

Fall / Day 2: Harvest and Curing

- Gloves (optional)
- Boxes or crates
- Cloth or newspaper

Fall / Day 3: Sweet Potato Expo

- Sweet potatoes (cooked /raw)
- Cheese cloth
- Wagon

Spring / Day 4: Starting Slips

- 5 – 24 organic sweet potatoes
- Knife for teacher to cut potatoes
- Glass jars or clear plastic cups (one per student) or roasting pan
- Toothpicks (four per student)
- Biography of GW Carver such as In the Garden with Dr. Carver by Susan Grigsby

Spring / Day 5: Rooting Slips

- additional clear jars for rooting

Spring / Day 6: Transplanting Slips

- Prepared garden space or pots
- Sand (optional)

Garden Connection

Students will grow and harvest sweet potatoes in the garden.

Overview

Students will harvest sweet potatoes in fall, planted by the previous year's class, and learn about George Washington Carver's contributions to agriculture by replicating and trying some of his inventions and recipes. In spring, they will plant a new crop of sweet potatoes and demonstrate some of Dr. Carver's best practices for farming, maintaining soil fertility, and avoiding plant diseases. In the process, they will count the harvest and identify plant parts.

Guiding Questions

Who was Dr. George Washington Carver?

What are some of his discoveries, inventions, recipes, and farming techniques?

How can I grow sweet potatoes?

What can I invent using plants that grow in the school garden?

Engaging Students

Students will brainstorm inventions from the garden before learning about Dr. Carver's inventions. The teacher will read the class a biography such as In the Garden with Dr. Carver by Susan Grigsby or an online story about the uses Dr. Carver discovered for sweet potatoes.

Exploration

Students will grow sweet potatoes from slips; replicate some of Dr. Carver's recipes, discoveries and inventions; and compare the time when he lived to present-day food, clothing, homes, transportation, communication and recreation.

Explanation

Students will be able to explain how Dr. Carver contributed to the well-being of farmers by teaching them good farming practices, how to eat a healthy diet from easy-to-grow Southern crops, and how to make things from plants.

Environmental Stewardship

Students will plant and grow sweet potatoes in the school garden (or classroom container gardens) and choose one or more of Dr. Carver's farming practices to demonstrate, such as crop rotation, cover crops, composting and mulching, or mixing sand in soil for sweet potatoes.

Extension

Math: Chart growth and number of leaves of sweet potato slips.

Science: Design an invention using sweet potato plants or cotton balls.

Evaluation

Students will be able to tell about Dr. Carver's importance in history and agriculture; demonstrate some of Dr. Carver's inventions or best practices for farming, and compare present times to the time when he lived.

Standards

Georgia Performance Standard in Social Studies

SS1H1 The student will read about and describe the life of historical figures in American history

- a. Identify the contributions made by (various figures, including) George Washington Carver (science).
- b. Describe how everyday life of these historical figures is similar to and different from everyday life in the present (food, clothing, homes, transportation, communication, recreation)

Georgia Performance Standards for Common Core Math

MCC1.NBT.2 Understand that the two digits of a two-digit number represent amounts of tens and ones. Understand the following as special cases:

- a. 10 can be thought of as a bundle of ten ones — called a “ten.”
- b. The numbers from 11 to 19 are composed of a ten and one, two, three, four, five, six, seven, eight, or nine ones.
- c. The numbers 10, 20, 30, 40, 50, 60, 70, 80, 90 refer to one, two, three, four, five, six, seven, eight, or nine tens (0 ones).

Next Generation Science Standards

1.LS1.A: Structure and Function

All organisms have external parts. . . . Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow. (1-LS1-1)

Background Information

George Washington Carver is well known for his work with peanuts, and he also invented hundreds of ways to use sweet potatoes. Due to the prevalence and severity of peanut allergies among students, sweet potatoes are a better choice for school gardens. Also, they are easy to grow, and their greens are edible, as well as the roots. This lesson takes advantage of the fact that sweet potatoes can be planted in May and grow with little care over the summer for a fall harvest. If a school garden is not available, sweet potatoes can be grown in large pots or in hanging baskets. The teacher should read Sweet Potato Background Teaching Information (below) and may also refer to the following resources:

- Growing sweet potato slips: <http://www.diynetwork.com/how-to/how-to-plant-and-grow-sweet-potatoes/index.html>
- Growing sweet potatoes organically: <http://www.organicgardening.com/learn-and-grow/sweets-holidays?page=0,1>
- Transplanting sweet potato slips (video): <https://www.youtube.com/watch?v=J6D29uMuaAg>

Sweet Potato Background Teaching Information

Nutrition: Sweet potatoes are a nutrient-rich food. They contain high levels of beta-carotene and vitamin E, as well as, potassium, iron and vitamin B6. Sweet potatoes are nearly fat free, cholesterol free and low in sodium. Sweet potatoes are also high in dietary fiber, which is important for a healthy digestive system. The way to get the best possible nutrition from a sweet potato is to eat the skin along with the flesh.

Colors of a sweet potato: Sweet potatoes grow in a variety of colors. Skins come in red, purple, copper, pink and flesh comes in orange, copper, cream, white and purple. The most common is the Covington sweet potato it is pink outside with orange flesh. The more orange the flesh the higher the nutritional content.

Using sweet potatoes: Sweet potatoes can be baked, boiled, steamed or microwaved. They are great mashed and roasted. Sweet potatoes can be used in baking (to make breads, pies, etc.) and in soups, stews and casseroles. The leaves can be harvested and cooked like spinach. The possibilities are endless!

Storing: Sweet potatoes can last for around 10 months if stored properly. They should be stored in a dry place at between 55-60°F. Do not store in the refrigerator, refrigeration causes a hard flesh and undesirable taste.

Growing: Sweet potatoes grow best in hot places. Most of our sweet potatoes are grown in the south. They require a long period of time without frost (90 -150 days). They are a fairly easy to plant and grow if you live in a place with the right conditions. Sweet potatoes should be harvested soon after the first frost.

Sweet Potato vs. Yam: In America we use the term “yam” and the term “sweet potato” interchangeably but in the U.S. we really mean “sweet potato”. Yams and sweet potatoes are actually very different. Yams are an African/Caribbean grown tuber and sweet potatoes are a storage root closely related to morning glories. Yams grow larger in size and are rougher in texture. They are starchy with dry flesh. Sweet potatoes, on the other hand (what we are familiar with), are smooth, sweet, and much smaller in size with a moist flesh. You will most likely never see a true yam in the grocery store here although they may be labeled as one. They are actually sweet potatoes

Teacher Preparation

- Choose a book from the many available about George Washington Carver's life to share with your class.
Recommended Reading: [In the Garden with Dr. Carver](#) by Susan Grigsby
OR Free online stories to read, if a biography is not available:
<http://science.howstuffworks.com/innovation/famous-inventors/george-washington-carvers-inventions3.htm>
<http://www.brainpopjr.com/science/plants/georgewashingtoncarver/grownups.weml>
http://www.tuskegee.edu/about_us/legacy_of_fame/george_w_carver/carver_sweet_potato_products.aspx
- About a week in advance of starting sweet potato slips in early spring, send a note home to parents asking for ORGANIC sweet potatoes and clear jars (jam or salsa size) to be donated for class activities. (Note that regular non-organic sweet potatoes are treated to prevent sprouting and will not work as well). The ideal number would be one sweet potato per two children, but as few as six sweet potatoes could be cut in quarters and distributed to 24 students. Also solicit parent volunteers to prepare food and assist with Sweet Potato Expo Day at school.
- After harvesting and curing sweet potatoes in fall, save some unwashed potatoes in a cool, dry, dark place so they can be used to grow slips next spring. Set a date for the Sweet Potato Expo and recruit parents to assist, in advance.

PROCEDURES FOR LESSON ACTIVITIES

Day 1: Engagement

- Ask students to brainstorm ideas for preparing foods and inventing products that could be made from plants in the garden, such as sweet potatoes. Record ideas on a whiteboard or flipchart, if desired. Accept all suggestions.
- Read a book or story about Dr. George Washington Carver and his discoveries and inventions using sweet potatoes.
- After the book, ask students if their earlier brainstorms included any of the same ideas as Dr. Carver's. Tell students that when they go outside, to remember to look around the garden and try to see it through George Washington Carver's eyes, 130 years ago. Do they have any new ideas for using plants from the garden in ways that help people?

IN FALL

Day 2: Exploration- Harvesting and Curing Sweet Potatoes / Preparing for the Sweet Potato Expo

- Take students to the garden to see sweet potatoes growing. Have students identify plant parts prominent at each stage of development. Note that the potato itself is part of the root, the leaves are edible, and the seed is rare to see.
- Let students harvest sweet potatoes planted by the previous year's class. (Determine what share of the sweet potatoes in the garden should be harvested by your class, if this project is being undertaken by the entire grade level).
- Sweet potatoes can be harvested in fall as soon as four weeks after flowers appear on the vines, or after frost kills the vines). Although Beauregard and Georgia Jet varieties mature in three months, most types require four months.
- Show students how to gently pull an entire hill of potatoes out by the stems of the vine OR cut and pull the vines away before digging gently with a potato fork or with hands to unearth potatoes.
- Without washing sweet potatoes, tell students to group them in sets of ten with leftover singles, and practice counting by tens and ones; regroup with a different number of sweet potatoes and count again by tens and ones.
- Handle sweet potatoes gently so they don't bruise or get wounded. "Cure" them after harvest by snapping off pieces of excess root or vine and placing unwashed sweet potatoes in stacked boxes or crates covered by newspapers or cloth in a warm moist place for one to two weeks. Temperatures should be 80 to 90 degrees and humidity can be raised by placing a bucket of water nearby. This develops a thick skin that "cures" nicks or cuts so they won't rot and allows starches to turn to sugars. After curing, sweet potatoes should be moved to a cool place (55 to 60 degrees) without washing.
- Reading from Dr. Carver's original bulletins containing advice for farmers, ask students to identify at least one recipe he invented for making sweet potatoes to eat and one idea he had for using sweet potatoes without eating them.
 - Carver Sweet Potato Bulletin <http://www.biblicalscholarship.net/carver38.htm>
 - Carver inventions and products <http://www.add.lib.iastate.edu/preserv/cdm/gwcfurtherresearch.html>
- Set a date for the Sweet Potato Expo about one or two weeks from the harvest, after potatoes have cured.
- Assign student projects OR enlist parent-volunteers to stage the Expo. The Expo should give students a chance to taste-test Dr. Carver's sweet potato recipes, compare to modern recipes, and try out inventions he made from sweet potatoes such as glue, dye and detergent. Dr. Carver's bulletins contain recipes for his foods and directions for his inventions.
- (For Georgia classes): Also assign exhibits to show clothing, transportation, housing and recreation during the time Dr. Carver lived (1864 – 1963). Be sure all food or inventions are identified and include directions.
- Provide harvested sweet potatoes to students for cooking or for making inventions to bring to the Expo. Make sure students know that they should not cook without adult assistance.
- An example of a modern recipe might be sweet potato fries: wash and cut sweet potatoes into fries, toss in a zip-top bag

with just enough olive oil to cover the potatoes, spread fries on a cookie sheet, and bake at 400 degrees for 40 min.

Day 3: Exploration- Sweet Potato Expo (after curing potatoes / one week or more after harvest)

- Set up interactive stations or centers around the classroom, each featuring a recipe to taste-test, an invention to try, or a farming technique to see displayed. Also set up mini-exhibits or pictures to show differences in clothing, transportation, housing and recreation during Dr. Carver's lifetime and now.
- Divide the class into teams and let them rotate through the stations. Give out stickers or stars for trying the activity or food featured at each station and require students to accumulate a minimum number of stickers.

Also on Day 3: Explanation

- Bring the class back together after the Expo to discuss students' favorite activities, inventions and recipes, as well as differences in clothing, transportation, housing, recreation and food, during Dr. Carver's lifetime and now.
- Dr. Carver took information and inventions out to farming communities in his Jessup Wagon. In the early days, the wagon was pulled by a horse. Later, it was pulled by a truck. Tell students they will each get a chance to talk about three things Dr. Carver invented or advocated, and they can remind themselves of what they want to talk about by gathering an artifact from an Expo station or exhibit and putting it in the class's Jessup Wagon. When their time comes to talk, each student will pull two items from the wagon to use as talking "prompts," that will remind them of what they want to say. Jessup wagon: <http://www.nps.gov/museum/exhibits/tuskegee/gwcwagon.htm>

IN SPRING

Day 4: Environmental Stewardship / Starting Sweet Potatoes for the Organic School Garden

- Start sweet potato slips by providing each student with a whole or half sweet potato. Assist students in poking toothpicks all around the middle of the potato so the potato is held up at the top of a jar of water with the round end (if whole) or cut end (if cut in half) immersed in the water and about half the potato above the mouth of the jar. As an alternative, if no jars or cups are available, use an aluminum roasting pan with water in the bottom and have students arrange a row of sweet potatoes near one end of the pan so that the pointed end of each sweet potato is tilted up against the side of the pan and the round end is in the water; add subsequent rows of potatoes with pointy ends resting on top of the previous row and round ends in the water. Place in a sunny window and add water as needed.

Day 5: Environmental Stewardship / Rooting Sweet Potato Slips for the Organic School Garden

(2 – 4 weeks after starting slips, depending on growing conditions)

- When each of the sweet potato sprouts (called "slips") has six to ten leaves, they are ready to remove and root in water. Tell students to remove slips by twisting each one off as close to the original potato as possible. Place slips in jars or cups of water to grow roots.

Day 6: Environmental Stewardship: Preparing the Soil and Transplanting Rooted Slips to the Organic Garden

(2 – 4 weeks after putting slips in water to root)

- Take rooted slips outside to the garden (or to a pot or hanging basket) to plant. Daytime temperatures should be in the 80s and 90s to promote fast growth.
- Refer to Dr. Carver's farmer bulletins on growing sweet potatoes and have the class demonstrate at least two of his farming "best practices". These might include adding sand to clay soils, using compost as a natural fertilizer, using mulch to retain moisture, mounding long 12" tall hills to warm soil and make room for vining plants such as sweet potatoes, rotating crops to avoid letting diseases and pests build up in the same place each year, planting disease- and bug-resistant varieties of sweet potatoes, and planting a legume cover crop during winter to be tilled into the soil to make nitrogen available to sweet potato plants.

Carver Sweet Potato Bulletin <http://www.biblicalscholarship.net/carver38.htm>

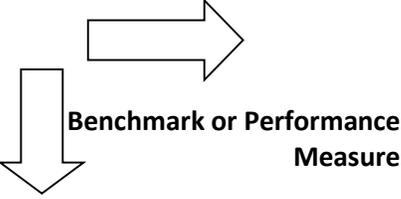
Carver inventions and products <http://www.add.lib.iastate.edu/preserv/cdm/gwcfurtherresearch.html>

Extensions:

- Math: measure and chart the growth of sweet potato slips from Day 4 until they are transplanted to the garden.
- Try Brain Pop's activities <http://www.brainpopjr.com/science/plants/georgewashingtoncarver/growups.weml>
- Check out activities from the Teacher Guide for *In the Garden with Dr. Carver* by Susan Grigsby (free download): http://www.albertwhitman.com/resources/BookResources/1/9/documents/aw510.05_carver_tg_r13.pdf

Assessment for George Washington Carver and the Sweet Potato

Student Name(s): _____ Date: _____

| <p style="text-align: center;">Level of Mastery</p>  <p style="text-align: center;">Benchmark or Performance Measure</p> |  <p style="text-align: center;">EMERGING Not yet proficient 1 point</p> |  <p style="text-align: center;">COMPETENT Partially proficient 4 points</p> |  <p style="text-align: center;">PROFICIENT Mastered task with 80%+ proficiency 5 points</p> | <p style="text-align: center;">TOTAL POINTS</p> |
|--|---|---|--|--|
| <p>Students can demonstrate and talk about some of George Washington Carver's important contributions to history, using prompts from the Jessup wagon if necessary.</p> <p>Students will also be able compare and contrast aspects of George Washington Carver's everyday life (1864-1943) to modern living.</p> | <p>Student can name 1 or none of the contributions George Washington Carver made to history, after demonstrating practices or inventions and taste-testing recipes at the Sweet Potato Expo.</p> <p>Student cannot compare (note a similarity or difference) at least one aspect of Dr. Carver's life to modern times, in terms of food, clothing, homes, transportation, communication, recreation, or race and slavery.</p> | <p>Student can name 2 contributions George Washington Carver made to history, after demonstrating practices or inventions and taste-testing recipes at the Sweet Potato Expo.</p> <p>Student can compare (note a similarity or difference) at least one aspect of Dr. Carver's life to modern times, in terms of food, clothing, homes, transportation, communication, recreation, or race and slavery.</p> | <p>Students can name 3 or more contributions George Washington Carver made to history, such as teaching good farming practices (i.e. composting and cover crops to enrich the soil and crop rotation to avoid disease); foods he made from sweet potatoes or peanuts; non-edible uses for plants and clay such as dyes and paints, medicine, glues, and fabrics; cotton products such as rugs and string; or the Jessup wagon "traveling school" for farmers.</p> <p>Student can compare Dr. Carver's life to modern times in at least two ways.</p> | |
| <p>Students will be able to group and count sweet potatoes in base ten.</p> | <p>Student cannot arrange potatoes in groups of tens and leftover ones and cannot count total.</p> | <p>Student can arrange potatoes in groups of ten plus singles but cannot count by tens and ones to get total.</p> | <p>Student arranges potatoes in groups of ten plus singles and can count by tens and ones to get correct total.</p> | |
| <p>Students will be able to recognize parts of a plant and identify edible parts of a sweet potato plant.</p> | <p>Student is unable to identify the parts of a sweet potato plant; and cannot correctly identify the sweet potato as part of the root system.</p> | <p>Student either identifies the sweet potato as a root or correctly identifies the other parts of the plant, but not both.</p> | <p>Student is able to identify parts of a sweet potato plant including flower, fruit, stem, and leaves; and correctly identify the sweet potato as part of the root system.</p> | |

